

REMARKS

Entry of the foregoing, re-examination and reconsideration of the application identified in caption, as amended, pursuant to and consistent with 37 C.F.R. §1.114, and in light of the remarks which follow, are respectfully requested.

By the above amendments, claim 1 has been amended to incorporate the features of claim 17 therein. Claim 1 has also been amended for readability by replacing the phrase "thereby forming" with "to form." New claim 20 is directed to a method wherein the polysaccharide fibers precipitate in the bath. New claim 21 is directed to a method wherein the polysaccharide fibers precipitate in the bath simultaneously with the ionic cross-linking of the polysaccharide. Support for new claims 20 and 21 can be found in the instant specification at least at page 6, lines 13-17. Entry of these amendments is proper at least because a Request for Continued Examination is filed concurrently herewith. See 37 C.F.R. §1.114.

In the Official Action, claims 1-17 and 19 stand rejected under 35 U.S.C. §103(a) as being obvious over European patent document No. 232,121 (*EP '121*) in view of U.S. Patent No. 4,197,371 (*Holst et al*). This rejection was previously applied in the Official Action dated March 3, 1999 (Paper No. 4), and withdrawn in the Interview Summary dated October 6, 2000 (Paper No. 19). Withdrawal of this rejection is respectfully requested for at least the following reasons.

According to one aspect of the present invention as defined by amended claim 1, a method of producing polysaccharide fibers is provided. The method comprises the steps of dissolving a polysaccharide in a solvent to form a solution, and spraying the solution into a bath which contains a water-miscible organic solvent and a cross-linker, wherein the solvent

dissolving the polysaccharide is water, and wherein the cross-linker ionically cross-links the polysaccharide.

As discussed at page 5 of the instant specification, the addition of conventional cross-linkers to a solution prior to the extrusion of the solution can create serious drawbacks in a large-scale process, e.g., a slower rate of precipitation and the fastening of the coagulate to the extrusion nozzle. Advantageously, the use of the inventive ionic cross-linker in accordance with the present invention can conspicuously ameliorate or overcome the above disadvantages.

EP '121 relates to water-absorbent materials useful in medical dressings (*EP '121* at col. 1, lines 3 and 4). *EP '121* discloses dissolving a carboxylate ester of a polysaccharide in an organic solvent, and extruding the resulting solution through a jet into an aqueous medium to form fibers (*EP '121* from col. 1, line 60 to col. 2, line 6).

EP '121 does not disclose or suggest each feature of the presently claimed invention. For example, *EP '121* does not disclose or suggest spraying a solution into a bath which contains a water-miscible organic solvent and a cross-linker, wherein the cross-linker ionically cross-links the polysaccharide, as recited in claim 1. By comparison, *EP '121* discloses that the cross-linking agent present in the spinning dope thereof forms covalent chemical cross-links between hydroxyl groups of polymer chains, not ionic cross-links as presently claimed (*EP '121* at col. 1, lines 19-22). Moreover, because *EP '121* discloses that such covalent cross-linking advantageously results in "a water-insoluble but water-swellaable fibre," one of ordinary skill in the art would not have been motivated to replace such covalent cross-links with ionic cross-links in the polymer chains (*EP '121* at col. 4, lines 33 and 34). Quite simply, *EP '121* fails to disclose

or suggest the use of a cross-linker which ionically cross-links a polysaccharide, let alone the advantages of using such ionic cross-linking agent discussed above.

In addition, *EP '121* does not disclose or suggest spraying a solution formed by dissolving a polysaccharide in water into a bath which contains a water-miscible organic solvent, as recited in claim 1. Rather, *EP '121* discloses dissolving a polysaccharide ester in an organic solvent, and extruding the resulting spinning dope into an aqueous medium (*EP '121* at col. 3, lines 14-17 and 62-64). *EP '121* simply has no disclosure or suggestion of spraying a solution formed by dissolving a polysaccharide in water into a bath which contains a water-miscible organic solvent.

In this regard, it is well established that for a *prima facie* case of obviousness to exist, there must be some suggestion or motivation either in the reference itself or in the knowledge generally available to one of ordinary skill in the art, to modify the reference. See M.P.E.P. §2143. In the present case, the Patent Office has failed to provide such suggestion or motivation to modify *EP '121* in the manner alleged in the Official Action. In particular, the Official Action at page 2 states the following:

. . . no patentable difference is noted as to whether the polysaccharide is dissolved first in water and then combined with an organic solvent or dissolved first in an organic solvent and then combined with water.

It appears that the Patent Office has taken the position that it would have been obvious to modify *EP '121* by interchanging the organic solvent and the aqueous medium, thereby resulting in a process in which a spinning dope is formed by dissolving a polysaccharide carboxylate ester in an aqueous medium, and the spinning dope is extruded into an organic solvent. However, the

Patent Office has not provided the requisite motivation or suggestion to interchange the organic solvent and the aqueous medium of *EP '121*.

In this regard, *EP '121* fails to provide any disclosure or suggestion that the organic solvent (used in *EP '121* to dissolve the polysaccharide carboxylate ester) can be used as a medium in which the spinning dope precipitates in fibrous form, as suggested in the Official Action. Further, *EP '121* fails to disclose or suggest that the aqueous medium (used in *EP '121* as a precipitation medium of the spinning dope) can be used to dissolve the polysaccharide carboxylate ester, as also suggested in the Official Action. Simply put, absent an improper resort to Applicants' own disclosure, one of ordinary skill in the art would not have been motivated to modify *EP '121* by interchanging the organic solvent and the aqueous medium thereof.

Furthermore, *EP '121* fails to disclose or suggest spraying a solution into a bath which contains a water-miscible organic solvent and a cross-linker, as recited in claim 1. That is, according to an exemplary aspect of the present invention, the cross-linker is contained in a bath into which the dissolved polysaccharide is sprayed. By comparison, *EP '121* does not disclose that the aqueous medium (into which a spinning dope is extruded) contains a cross-linking agent. Rather, *EP '121* discloses that a latent cross-linking agent is incorporated into the spinning dope itself (*EP '121* at col. 3, lines 38-40). Clearly, *EP '121* fails to disclose or suggest spraying a dissolved polysaccharide solution into a bath which contains the cross-linker.

For at least the reasons set forth above, it is apparent that *EP '121* fails to disclose or suggest each feature of the presently claimed invention.

Holst et al does not cure each of the above-described deficiencies of *EP '121*. In combining *Holst et al* with *EP '121*, the Patent Office has relied on *Holst et al* for allegedly

disclosing that the attachment of compounds such as polyvinylamine or Polybrene to polysaccharides is well known in the art (Official Action issued March 3, 1999). However, one of ordinary skill in the art would not have been motivated to combine *EP '121* with *Holst et al* in the manner suggested in the Official Action.

In this regard, *EP '121* discloses that the cross-linking agent thereof covalently chemically cross-links the polysaccharide carboxylate ester (*EP '121* at col. 1, lines 19-22). *EP '121* further discloses that such covalent chemical cross-linking provides particular advantages. For example, *EP '121* discloses that the covalent chemical cross-linking leads to "a water-insoluble but water swellable fibre" (*EP '121* at col. 4, lines 31-34). By comparison, *Holst et al* has no recognition or suggestion that the polyvinylamine thereof is effective to covalently cross-link a polysaccharide carboxylate ester. In fact, *Holst et al* does not even recognize or suggest the use of such polyvinylamine as a cross-linking agent for a spinning dope. Rather, *Holst et al* merely discloses that the polyvinylamine can be grafted onto cellulose as a "side chain."¹ As such, one of ordinary skill in the art would not have been motivated to substitute the *EP '121* covalent cross-linking agent with the polyvinylamine of *Holst et al* in the absence of any disclosure or suggestion that such polyvinylamine is effective to form covalent chemical cross-links.

For at least the above reasons, it is apparent that *EP '121* and *Holst et al* are not properly combinable in the manner suggested by the Patent Office.

¹See Hawley's Condensed Chemical Dictionary, 13th Edition, pages 237-38 (copies attached), which define "side chain" as "a group of atoms attached to one or more of the locations in a cyclic or heterocyclic compound . . ."

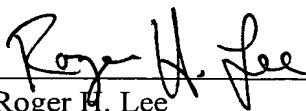
Moreover, assuming (incorrectly) that *EP '121* and *Holst et al* are properly combinable, *Holst et al* nevertheless fails to cure each of the above-described deficiencies of *EP '121*. For example, like *EP '121*, *Holst et al* does not disclose or suggest spraying a solution formed by dissolving a polysaccharide in water into a bath which contains a water-miscible organic solvent, as recited in claim 1. Furthermore, like *EP '121*, *Holst et al* does not disclose or suggest spraying a dissolved polysaccharide solution into a bath which contains the cross-linker, as recited in claim 1.

In view of the above, it is apparent that no *prima facie* case of obviousness exists. Accordingly, for at least the reasons set forth above, withdrawal of the §103(a) rejection is respectfully requested.

From the foregoing, further and favorable action in the form of a Notice of Allowance is believed to be next in order, and such action is earnestly solicited. If the Examiner has any questions relating to this paper, or the application in general, he is invited to telephone the undersigned at his earliest convenience.

Respectfully submitted,

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Application No. 09/101,341
Attorney's Docket No. 000500-128

Attachment to AMENDMENT AND SUBMISSION OF REQUEST
FOR CONTINUED EXAMINATION PURSUANT TO 37 C.F.R. §1.114
dated August 20, 2002

Marked-up claim 1

1. (Four Times Amended) A method of producing polysaccharide fibers, comprising the steps of dissolving a polysaccharide in a solvent[, thereby forming] to form a solution, and spraying the solution into a bath which contains a water-miscible organic solvent and a cross-linker, wherein the solvent dissolving the polysaccharide is water, and wherein the cross-linker ionically cross-links the polysaccharide.

cetyldimethylethylammonium bromide. $C_{16}H_{33}(CH_3)_2H_5NBr$. A quaternary ammonium salt.**Properties:** Paste.**Use:** Disinfectant, deodorant, germicide, fungicide, detergents.**cetyldimethylethylammonium chloride.** $C_{16}H_{33}(CH_3)_2C_2H_5NCl$. A quaternary ammonium salt.**cetylic acid.** See palmitic acid.**cetylic alcohol.** See cetyl alcohol.**cetyl mercaptan.** (hexadecyl mercaptan). $C_{16}H_{33}SH$.**Properties:** Liquid; strong odor. Fp 18C, bp 185–190C (7 mm Hg), d 0.8474 (20/4C), refr index 1.474 (20C), flash p 275F (135C). Combustible.**Grade:** 95% (min) purity.**Use:** Intermediate, synthetic-rubber processing, surface-active agent, corrosion inhibitor.**cetyl palmitate.** See cetin.**cetyl pyridinium bromide.** $C_{16}H_{33}C_5H_5NBr$. A quaternary ammonium compound.**Properties:** Cream-colored, waxy solid. Soluble in acetone, ethanol, and chloroform.**Use:** Germicide, deodorant, laboratory reagent, surfactant.**cetylpyridinium chloride.** (Ceepryn; Cepacol; Cetanium; Dobendan; 1-hexadecylpyridinium chloride; Medilave; Pristacin; Pyrisept).CAS: 123-03-5. $C_{21}H_{39}ClN \cdot H_2O$. A quaternary ammonium salt.**Properties:** (Monohydrate) White powder. Mp 77–83C, surface tension (25C) 43 dynes/cm (0.1% aqueous solution). Soluble in water, alcohol, chloroform; very slightly soluble in benzene and ether.**Use:** Antibacterial in cough lozenges and syrups; emulsifier.**cetyltrimethylammonium bromide.**

(hexadecyltrimethylammonium bromide).

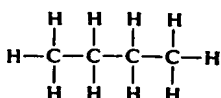
CAS: 57-09-0. $C_{16}H_{33}(CH_3)_3NBr$. A quaternary ammonium salt.**Properties:** White powder. Soluble in water, alcohol and chloroform.**Grade:** Technical.**Use:** Surface-active agent, germicide.**cetyltrimethylammonium chloride.** $C_{16}H_{33}(CH_3)_3NCl$. A quaternary ammonium salt.**cetyltrimethylammonium tosylate.** $[C_{16}H_{33}(CH_3)_3N]OSO_2C_6H_4CH_3$. A high-temperature stable quaternary ammonium compound.**Use:** Germicide, surfactant.**cetyl vinyl ether.** (vinyl cetyl ether). $C_{16}H_{33}OCH:CH_2$.**Properties:** Colorless liquid. D 0.822 (27C), mp 16C, bp 142C (1 mm Hg), 173C (5 mm Hg), flash p 325F (162C) (OC), refr index 1.444 (25C). Combustible.**Grade:** 97%.**Hazard:** Toxic by inhalation, skin irritant. Reacts strongly with organic materials.**Use:** Reactive monomer that may be copolymerized with a variety of unsaturated monomeric materials, including acrylonitrile, vinyl chloride, vinylidene chloride, and vinyl acetate to yield internally plasticized resins.**CF.** Abbreviation for citrovorum factor.

See folic acid.

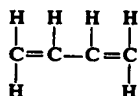
Cf. Symbol for californium.**"C-Fatty Acids" [Procter & Gamble].** TM for fatty acids derived from coconut oil. The major component acids are lauric and myristic. They differ primarily in amount of unsaturated acid components and color.**Properties:** Light-yellow solids that liquefy at approximately 25C. Obtained from naturally occurring triglycerides. Combustible.**Use:** Intermediate, rubber compounding, cosmetic ingredients, buffing compounds, alkyl resins, emulsifiers, grease manufacture, and candles.**CFE.** Abbreviation for chlorotrifluoroethylene. Also used for polychlorotrifluoroethylene resins.**cgs.** Abbreviation of centimeter-gram-second, a system of measurement used internationally by scientists.**chabazite.** $CaAl_2Si_4O_{12} \cdot 6H_2O$. Essentially a natural hydrated calcium aluminum silicate, usually containing some sodium and potassium. A zeolite.**Properties:** White, reddish, yellow, or brown color; vitreous luster. D 2.1. Mohs hardness 4–5.**Occurrence:** New Jersey, Colorado, Oregon, Europe.**Use:** Water treatment.**Chadwick-Goldhaber effect.** Dissociation of an atomic nucleus due to absorption of γ -rays.**Chadwick, Sir James.** (1891–1974). A British physicist who was awarded the Nobel prize in 1935 for his discovery of the neutron (1932), the existence of which had been predicted by Rutherford. See neutron.**chain.** A series of atoms of a particular element directly connected by chemical bonds, which con-

stitutes the structural configuration of a compound. Such chains are usually composed of carbon atoms and are often shown without their accompanying hydrogen. Carbon chains may be of the following types:

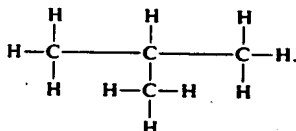
(1) Open or straight chain: a sequence of carbon atoms extending in a direct line, characteristic of paraffins and olefins, the former being saturated



and the latter unsaturated:



(2) Branched chain: a linear series of carbon atoms occurring in paraffinic hydrocarbons and some alcohols that is isomeric with its straight chain counterpart and has a subordinate chain of one or more carbon atoms:

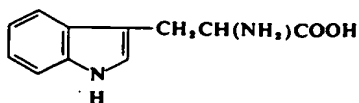


Such compounds are designated by the prefix *iso-*; the *iso*-paraffins are much more efficient in combustion than their straight-chain isomers, especially in gasoline. For example, octane has a low anti-knock rating, whereas that of isooctane is high.

(3) Closed chain or ring: a cyclic arrangement of carbon atoms giving a closed geometric structure, i.e., a pentagon or other form, characteristics of alicyclic, aromatic, and heterocyclic compounds.

See cyclic compound.

(4) Side chain: a group of atoms attached to one or more of the locations in a cyclic or heterocyclic compound, e.g., tryptophan:



chain initiation. The activation of one molecule in a mass of inert molecules subject to a chain reaction.

chain isomerization. Isomerization resulting from differences in arrangement of carbon atoms.

chain mechanism. See free radical.

chain reaction. See fission; nuclear energy.

chain stopper. A substance or event that stops the growth of a chain polymerization.

chain termination. The end of a chain reaction, when an activated molecule takes part in some reaction other than the one required to continue the chain.

chain transfer. The interruption of growth of a molecule chain by formation of a new radical that may act as a nucleus for forming a new chain.

chalcocite. (copper glance). Cu_2S . Natural cuprous sulfide, occurring with other copper minerals. **Properties:** Lead-gray color, tarnishing dull black, metallic luster. D 5.5–5.8, Mohs hardness 2.5–3. **Occurrence:** Montana, Arizona, Utah, Nevada, Alaska, Chile, Mexico, Europe. **Use:** Important ore of copper.

chalcopyrite. (copper pyrites; yellow copper). CuFeS_2 . Natural copper-iron sulfide found in metallic veins and igneous rocks. Also made synthetically.

Properties: Yellow or bronze iridescent crystals with metallic luster and greenish streak. D 4.1–4.3, Mohs hardness 3.5–4. May carry gold or silver or mechanically intermixed pyrite.

Occurrence: Montana, Utah, Arizona, Tennessee, Wisconsin, Europe, Chile, Canada.

Use: Important ore of copper, semiconductor research.

chalk. A natural calcium carbonate composed of the calcareous remains of minute marine organisms. Decomposed by acids and heat. Odorless, tasteless.

See calcite; calcium carbonate; whiting; chalk, prepared.

chalk, drop. See chalk, prepared.

chalk, French. A variety of soapstone or steatite. See talc.

chalking. A natural process by which paints develop a loose, powdery surface formed from the film. Chalking results from decomposition of the binder, due principally to the action of UV rays.

chalk, prepared. (drop chalk; calcium carbonate, prepared).

Properties: Fine, white to grayish-white impalpable powder; often formed in conical drops. Odorless; tasteless; stable in air. Mp (decomposes at 825°C with evolution of carbon dioxide). Decomposed by acids; practically insoluble in water; insoluble in alcohol. Noncombustible.

Derivation: By grinding native calcium carbonate to a fine powder, agitating with water, allowing the